alpine flora is extremely diverse in floristic composition; (3) the rare species are most numerous and the common species least numerous (this does not apply to number of individuals); and (4) the C.c. is generally higher for contiguous than for distant areas. This last result is strikingly demonstrated in the study of the vegetation upon some alpine gravel areas[11] of the Alps. In this latest report JACCARD also makes extensive use of his generic coefficient (*coefficient générique;* C.g.), that is,

$$\frac{\text{No. of genera} \times 100}{\text{No. of species}} = \text{C.g.},$$

with instructive results. This coefficient is shown by studies of both alpine and dune floras to vary inversely with the variety of ecological conditions in the areas compared, and hence in alpine areas the value of C.g. increases with altitude, while in some dune areas of Belgium, the C.g. is greatest (100) under the excessive and narrow ecological limits of the moving dunes, and least (73) under the more varied ecological conditions of the pannes.

These analyses lead the author to the following among other conclusions: (1) The distribution of plants (at least in the alpine zone) is a resultant of the combined action of three orders of factors; (*a*) ecological, (*b*) biological, or degree of adaptation, and (*c*) sociological, or competition between species; and (2) the action of these factors has resulted in (*a*) an eliminative selection of species, and (*b*) a distributive selection determining the number of individuals and the nature of associated species.—GEO. D. FULLER.

Tetraspore formation in Nitophyllum.—Since it has been shown that in *Polysiphonia* and *Dictyota* the reduction of chromosomes occurs during the formation of tetraspores from the tetraspore mother cell, it is natural to inquire what cytological conditions obtain during tetraspore formation in those red algae which have multinucleate cells. One might guess that the tetraspore mother cell is uninucleate, or that it is multinucleate and all the nuclei except one disorganize. Soon after YAMANOUCHI's paper on *Polysiphonia* appeared, SVEDELIUS examined *Martensia*, one of the Delesseriaceae. The tetraspore mother cell is multinucleate and, as the cell enlarges, the nuclei multiply until there are about fifty. Then all but one disorganize, and four tetraspores are formed. The fixing did not allow a detailed cytological study. Recently, however, SVEDELIUS[12] secured well fixed material of *Nitophyllum punctatum*, a member of the same family, and succeeded in working out the cytological situation. The thallus is prevailingly one cell thick, but when tetraspores are so formed, it becomes three or four cells thick. The tetraspore mother

[11] JACCARD, P., Étude comparative de la distribution florale dans quelques formations terrestres et aquatiques. Rev. Gén. Botanique **26**:5–21, 49–78. 1914.

[12] SVEDELIUS, N., Über die Tetradenteilung in den vielkernigen Tetrasporangiumanlagen bei *Nitophyllum punctatum*. Ber. Deutsch. Bot. Gesells. **32**:48–57. *pl. 1.* 1914.

cell has several nuclei, and nuclear division continues after the mother cell has become recognizable, but the number of nuclei seldom exceeds a dozen. In the vegetative mitoses the chromosomes are organized directly from the reticulum, but in the tetraspore mother cell the formation of chromosomes is preceded by a typical spirem stage. After the number of nuclei reaches about a dozen, some begin to disorganize, but several may develop spirems and continue up to a typical metaphase of the heterotypic mitosis; then one nucleus continues and all the rest disorganize. The details of the division of the successful nucleus and the organization of tetraspores agrees fully with the account given by YAMANOUCHI for *Polysiphonia*.—CHARLES J. CHAMBERLAIN.

Distribution and development of an Ohio flora.—A region in southern Ohio designated as "Sugar Grove" and situated at the end of a long lobe of Merriam's Alleghenian floral area, is regarded by GRIGGS[13] as remarkable on account of its being the meeting place of many very diverse floras. He has mapped six such groups, consisting of (1) Alleghenian plants, 39 species; (2) Appalachian plants (northern), 14 species; (3) Appalachian plants (southern), 12 species; (4) Carolinian plants, 12 species; (5) Mississippian plants, 15 species, and (6) northern plants, 9 species, and finds Sugar Grove upon extreme limits of each group. The data for establishing the range of these 121 plants are scanty, as the author admits, but that many of these species are near the limit of their distribution seems quite evident. This has led to an investigation of the behavior of many species at the edges of their range,[14] and almost every possible phase of behavior is found to be exhibited. So varied appear the responses that it would seem difficult to draw any general conclusions, although the author decides that the limits of species reaching the edges of their ranges near Sugar Grove are not fixed, but are changing, and that plants of boreal affinity are apparently being displaced by others from the west and south, a continuation of the floristic movements following the glacial period. *Tsuga canadensis* is cited as an example of such movements, and GRIGGS asserts that it is now found in southern Ohio only because it has not been completely displaced by the post-glacial flora, and occupies its habitats simply because within them the invading hardwood forest has not had so good an opportunity to gain a foothold as elsewhere. This explanation seems plausible, but the reviewer cannot regard the case as proved.—GEO. D. FULLER.

Prothallium of Equisetum.—KASHYAP[15] has investigated the prothallium of *Equisetum debile* as it grows in abundance in the vicinity of Lahore, India.

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[13] GRIGGS, R. F., Observations on the geographical composition of the Sugar Grove flora. Bull. Torr. Bot. Club **40**:487–499. 1913.

[14] GRIGGS, R. F., Observations on the behavior of some species at the edges of their ranges. Bull. Torr. Bot. Club **41**:25–49. 1914.

[15] KASHYAP, SHIV R., The structure and development of the prothallium of *Equisetum debile* Roxb. Ann. Botany **28**:163–181. *figs. 45*. 1914.